

Revision of the Genus *Pandanus* Stickman, Part 23
Three Australian Species of *Pandanus*

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THE SECTION *Microstigma* of the genus *Pandanus* has but three representatives in Australia. *P. de-Lestangii* Martelli was the first of these to be discovered and described.

P. adscendens St. John belongs in the large section *Pandanus*. Like many others of its species, this new one with smooth-sided phalanges has its habitat on the marine littoral.

P. darwinensis St. John was described earlier and the details of its phalanges were given. Now habit photos are at hand and they show vegetative and fruiting structures.

Pandanus de-Lestangii Martelli, Roy. Soc. Queensl. Proc. 38(5):57-58, pl. XI, 1926 (sect. *Microstigma*).

P. aquaticus F. Muell., Kew J. Bot. 8:324, 1856 (nomen provisorium); Fragm. Phytog. Austral. 5:40, 1865; and 8:220, 1874; Bentham, Fl. Austral. 7:149, 1878; Warburg, Engler's Pflanzenreich IV, 9:85, 1900; S. T. Blake, Austral. J. Bot. 2(1):130-132, pl. 7, fig. 3, 1954.

Figs. 240 and 241

DIAGNOSIS OF HOLOTYPE: Small and tree-like, forming dense clumps; trunk to 5 m in height, near the top 2-3-branched; prop roots numerous; each soon producing a new stem; leaves 1.8-2.7 m long, 7.5-8 cm wide near the base, 5.3 cm wide at the middle, bluish green, drooping, coriaceous, broadly channeled above the midrib, with 2 lateral pleats, at midsection with 62 parallel secondary veins in each side, throughout the lower side the tertiary cross veins conspicuous, forming long oblong meshes, the blade sword-shaped and from the base gradually tapering to the trigonous subulate unarmed apex which is about 15 cm long, this at 10 cm down 3.5 mm wide; the base amplexicaul and unarmed, but beginning about 6 cm up

the margins with prickles 2.5-3.5 mm long, 5-12 mm apart, slender arcuate subulate, appressed ascending, reddish tipped; the midrib below in lower and outer thirds unarmed; at midsection the margins with prickles 1.5-3.5 mm long, 10-17 mm apart, arcuate subulate, appressed ascending; the midrib below narrow, sharp, with prickles 2-3 mm long, 18-35 mm apart, slender subulate, closely appressed ascending; the apex almost unarmed; pistillate plant blooming in late October or early November, with 1-2 terminal syncarps; when ripe the syncarps 10-13 cm in diameter, broadly ellipsoid, 3-sided, green, at maturity the core in a few days shrinks to a remnant 7 cm long, 2.5 cm in diameter, and the drupes fall in a mass; drupes very numerous, 31-35 mm long, the abundant 1-celled ones 7-11 mm wide, 6-8 mm thick, narrowly oblanceoloid, upper ¼ free, 5-6-angled, the sides smooth, somewhat shiny, gently curving, the apex rounded pyramidal; stigma 1.5-2 mm long, broadly ellipsoid, creased, flush, oblique, excentric, brown, papillose; drupes with 1 cell are the normal, for on the holotype (FI) there are 136 such, and 21 with 2 cells, and 1 short basal one with 3 cells, while in the isotypic specimen (BRI) there are 173 with 1 cell, to 32 with 2 cells, and 1 short basal one with 3 cells. Martelli recorded ones with 4 or 5 cells. Of the 2-celled ones, 6 appeared to have a third stigma, but this was actually a corky scar, and the fruits had only 2 cells. The 2-celled drupes are 10-14 mm wide, the apex shallowly lobed, the cleft 1-3 mm deep, the stigmas 0.8-1 mm long, ellipsoid to obovate, horizontal or oblique, centripetal; the single 3-celled drupe (a short basal, asymmetric one) 26 mm long, 14 mm wide, 12 mm thick, deltoid-oblanceoloid, the stigmas centripetal, placed in a triangle; the 1-celled drupes with the endocarp central, bony, pale, the lateral walls 0.8-1.3 mm thick, the apex subtruncate; seed subcuneate-barrel-shaped, 7-8 mm long; the

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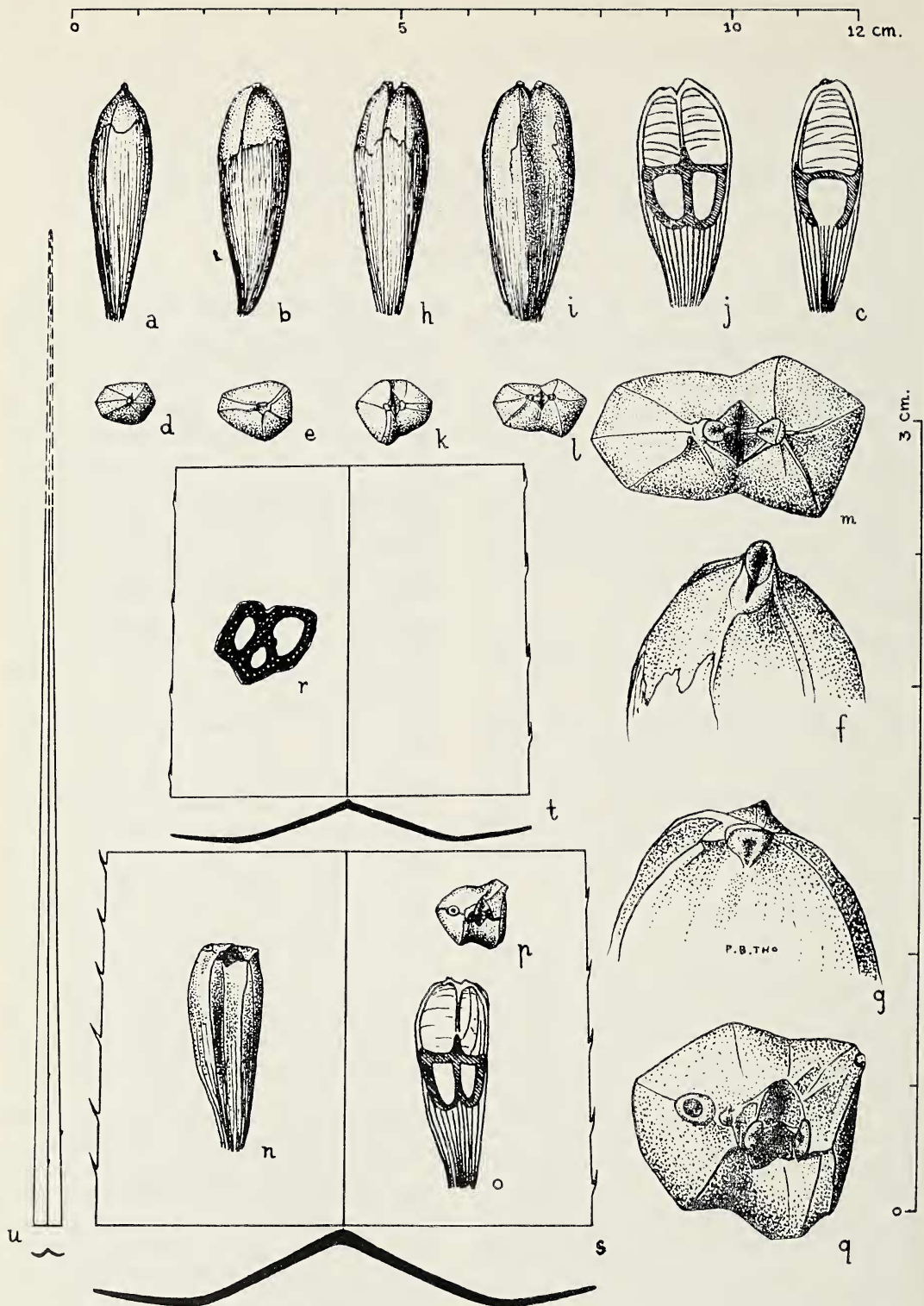


FIG. 240. *Pandanus de-Lestangii* Martelli, from isotype. *a, b*, 1-celled drupes, lateral view, $\times 1$; *c*, drupe, longitudinal median section, $\times 1$; *d, e*, drupes, apical view, $\times 1$; *f, g*, drupe apex, oblique view, $\times 4$; *b, i*, 2-celled drupes, lateral view, $\times 1$; *j*, drupe, longitudinal median section, $\times 1$; *k, l*, drupes, apical view, $\times 1$; *m*, drupe, apical view, $\times 4$; *n*, 2-celled drupe, lateral view, $\times 1$; *o*, drupe, longitudinal median section, $\times 1$; *p*, drupe, apical view, $\times 1$; *q*, 2-celled drupe, with corky scar imitating a third stigma, apical view, $\times 4$; *r*, 3-celled drupe, transverse section, $\times 1$; *s*, leaf base, lower side, $\times 1$; *t*, leaf middle, lower side, $\times 1$; *u*, leaf apex, lower side, $\times 1$.

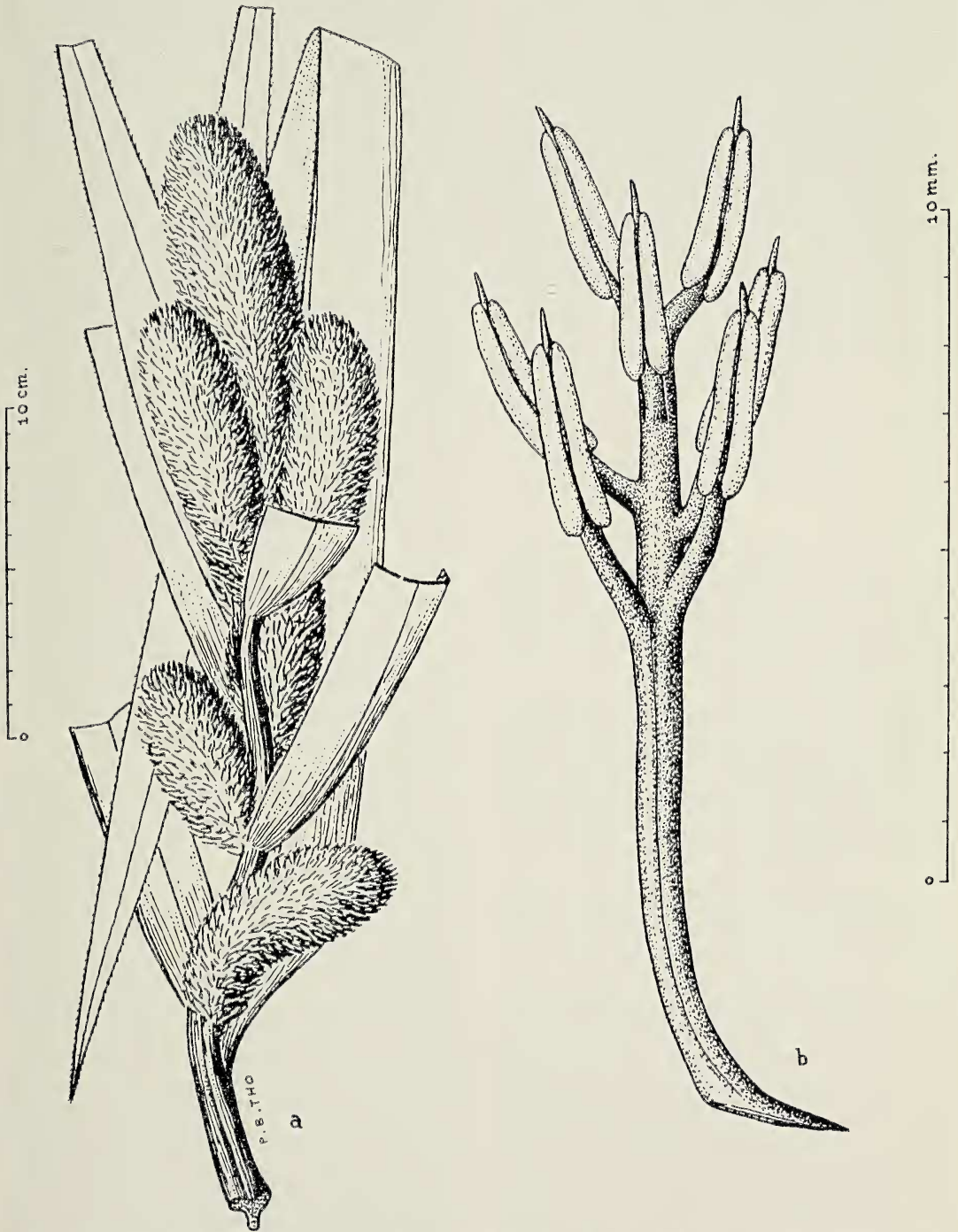


FIG. 241. *Pandanus de-Lestangii* Martelli, from type locality, 6 Nov. 1926, de Lestang. *a*, Staminate inflorescence, $\times \frac{1}{2}$, *b*, fascicle of stamens, $\times 10$.

2-celled drupes with the seeds median, similar but slightly oblique and 4 mm in diameter; apical mesocarp with numerous transverse, pale membranes; basal mesocarp fibrous and fleshy.

DESCRIPTION OF STAMINATE PLANTS: Growing mingled with the pistillate plants; plants blooming in October and November, bearing 1–2 staminate inflorescences, these with numerous pale leafy bracts, the median ones 31 cm long, 3 cm wide, ligulate, acute, firm, foliaceous, veiny, the middle and upper margins with ascending prickles 0.2–0.3 mm long, about 1 mm apart; spikes 3–6 cm long, 12–15 mm in diameter, finger-like, dense; fascicles of stamens about 15 mm long, divergent, the common filament base 7–10 mm long, bearing 4–7 stamens; free filament tips 0.5–2 mm long; anthers 2–2.9 mm long, oblong, bearing a subulate projection of the connective 0.5–0.6 mm long.

HOLOTYPE: "Australia; growing under palms along perennial streams about 200 miles southwest of Burketown (Burke District), Northwest Western Queensland," Albert de Lestang (FI)! Isotypes (BRI, K)!

The label on the holotypic specimen has the additional data: "abundant, February 1925. The nuts sent although green are fully grown. These nuts are the favourite food of two species of Turtle which abound in the streams where this pandanus grows."

SPECIMENS EXAMINED: Australia, same data as above, but 6 Nov. 1926 (staminate) (BRI); and ditto, 1927 (FI, K).

DISCUSSION: *P. de-Lestangii* Martelli is a clearly distinct species. The collector, A. de Lestang, was an amateur naturalist who gathered abundant material and recorded good data. Drawing his description and figures from this material, Martelli published this easily recognizable species. He described the drupes as with 1 cell, or 2–3, or rarely 4–5 in one series. His illustrations show 1–2–3-celled drupes in lateral and apical views, and 1–2-celled ones in longitudinal median section. The holotype (FI) has been studied, as well as the abundant isotype (BRI); together these contain 309 drupes that

are 1-celled, 53 of the 2-celled, and 2 of the 3-celled. On the angular shoulders leading to the apex of the broader drupes there are often pale, corky scars, very similar to stigmas, especially if the apex is partly eroded. For instance, when the writer first carefully sorted the drupes of the isotype, he separated 7 as with 3 cells, judged by the apparent stigmas. Later, by sectioning some, and by comparison, it was discovered that 6 of them had the body only 2-lobed and in section 2-celled, 2-seeded. In each case they had two stigmas in a line, and the third spot was actually a corky scar, not a stigma. The single remaining one was truly 3-celled, but it was a shorter, asymmetric, basal one with the three stigmas in a triangle and centripetal.

Count Martelli assigned *P. de-Lestangii* to section *Hombronia*, as its only representative on the Australian continent. On the contrary, it is now clear that when the stigmas are 2, they are in line but centripetally directed, flush, and elliptic to obovate or suborbicular. When 3, the stigmas are centripetal. In true *Hombronia* the several stigmas are arranged in a line or in several parallel lines, with the stigmas like flaps or teeth directed laterally at right angles to the line of carpels. In structure the fruits of *P. de-Lestangii* are quite at variance with this section. The species is here reassigned to the section *Microstigma*.

A. de Lestang in later observations (in litt. ad W. D. Francis, 30/9/42) stated that the species succeeds well in cultivation as an ornamental or for hedges, even in dry ground. "In the wild state thrives in bog and shallow water, loving best the fringe of deep pools where it anchor[s] itself with props extending to the bottom of the deepest water. In spring displays long spikes of yellowish flowers, male sessile, . . ." On his staminate sheet is his letter with many details, including: "Each grown tree blooms late in October and early November carrying one or two male inflorescences but only the older trees bear syncarps rarely more than two. Both male flowers and syncarps grow simultaneously on neighbouring limbs, and the specimens forwarded were from one tree."—He seems to state that the trees are monoecious, but no such species is known. It is quite possible that he observed interlacing branches from adjacent staminate and pistillate plants. Until

proven to the contrary, it will be assumed that this species is dioecious, like all other known species of *Pandanus*.

He continues: "When a syncarp is fully grown (if allowed) although still green, the balloon-like oval-shaped stem shrinks to nothing within a few days, as soon as the stem [or core] begins to shrink the drupes fall down, slipping in a bunch.

"Thousands of White Cockatoos (*Cacatua galerita*) systematically comb the *Pandanus* for syncarps, beginning in February, they tear down each drupe in quest of a kind of fly larvae which, I think, are solely associated with this fruit. The greater part of the drupes fall in the water below where herds of turtles gluttonously swallow whole the falling drupes; those falling upon the banks are not lost either, for when all the *Pandanus* are clean of syncarps the cockatoos search the ground carefully for the dry nuts and with their powerful beak crush and extract the edible parts."

Consideration must be given to *P. aquaticus* F. Muell., which in 1856 was published as a provisional name, but in 1865 and 1874 was validated as a species. In these accounts von Mueller stated that the plant lacked aerial roots, was smaller and more slender, and had separate drupes. He gave no locality and cited no specimens. Legally *P. aquaticus* F. Muell. is valid. The holotype in Melbourne was studied in 1958. It is a single leaf 79 cm long, 3.7 cm wide. It was collected in December 1855 on the Upper Victoria River, labeled with the name von Mueller, but probably was collected by Leichhardt. No fruit was preserved. An isotype of this was sent to Kew, and Solms stated (Linnaea 42:69, 1878) that it was staminate. Warburg listed it (Engler's Pflanzenreich IV, 9:85, 1900) with the "Species incertae sedis," and could neither supplement the description nor cite additional collections. S. T. Blake (Austral. J. Bot. 2:131, 1954) reviews the history of von Mueller's several publications of *P. aquaticus* and concludes correctly that his "remarks given are sufficient to validate the name." He reduces *P. de-Lestangii* Martelli to its synonymy, believing that there is but a single *Pandanus* species with unicellular drupes in the area of northern Northern Territory and north-west Queensland.

The present writer is in full sympathy with efforts to document and establish the identity of early described species. However, in this case, *P. aquaticus* F. Muell. rests upon a few non-diagnostic, descriptive words, and upon one leaf and a staminate inflorescence. It seems best treated as a valid name for a species so incompletely known that it should be left a species dubia, particularly as it is not safe to assume that only a single species of *Pandanus* can grow in one area. The next name, *P. de-Lestangii* Martelli, was based on good material from near Burketown, Queensland, and was published with an excellent diagnosis and illustration. This name is here adopted.

Pandanus adscendens sp. nov. (sect. *Pandanus*)

Fig. 242

DIAGNOSIS HOLOTYPE: Arbor 7 m alta 18 cm diametro, cortice tuberculosa, radicibus ful-turosis 1–1.5 m longis 4 cm diametro verruculosi, foliis 1.3–1.6 m longis proxima basem 7 cm latis in media 5.5 cm latis coriaceis in sectione oblate sinuose M-formati gladi-formati ex basi in apice subulato diminuentibus (apice non preservato) basi amplexicauli et inermi, ex 6–9 cm marginibus cum aculeis 1.8–3 mm longis 3–11 mm separatis crassiter subulatis adscendentibus brunneis vel cum apicibus brunneis, midnervo infra ex 15–20 cm cum aculeis 1.6–2.2 mm longis 13–45 mm separatis graciliter subulatis adscendentibus, in sectione mediali marginibus cum subulato-serris 1–2 mm longis 4–10 mm separatis, midnervo infra cum serris simulantibus sed 10–32 mm separatis, proxima apicem marginibus et midnervo infra cum subulato-serrulis 0.2–0.7 mm longis 2–7 mm separatis, pedunculo 13 cm longo bracteato, syncarpio solitario, nucleo 13 cm longo 4.5 cm diametro cylindrico-ellipsoideo obtuse deltoideo, phalangibus 5–5.6 cm longis 3.3–4.2 cm latis aurantiaco-luteis crassiter pyriformatis vel cuneato-pyriformatis apice rotundato (rariter subtruncato) parte $\frac{2}{5}$ supera libera, suturis lateralibus per $\frac{1}{2}$ –1 parte libera distinctis 4–7-angulosis lateribus lateralibus laevibus lucidis in sicco palliditer brunneis subcurvatis vel planis, sinibus centralibus apicalibus

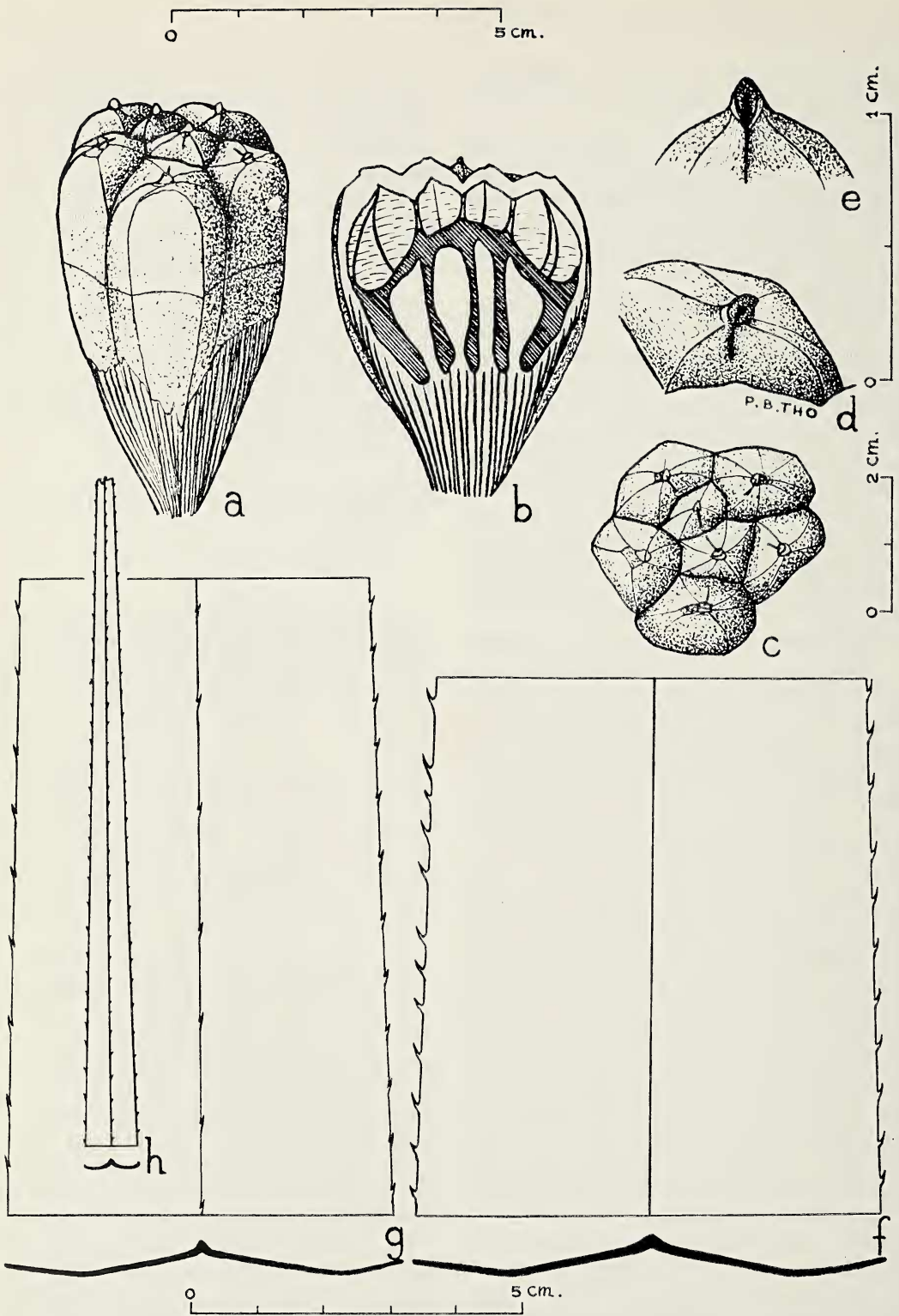


FIG. 242. *Pandanus ascendens* St. John, from holotype. *a*, Phalange, lateral view, $\times 1$; *b*, phalange, longitudinal median section, $\times 1$; *c*, phalange, apical view, $\times 1$; *d*, apex of marginal carpel, oblique view, $\times 4$; *e*, apex of central carpel, oblique view, $\times 4$; *f*, leaf base, lower side, $\times 1$; *g*, leaf middle, lower side, $\times 1$; *h*, leaf apex, lower side, $\times 1$.

3–6 mm profundis V-formatis, carpellis 6–11 apicibus centralibus minoribus rotundato-pyramidalibus vel suboblato-pyramidalibus illis marginalibus valde oblato-pyramidalibus vel semiorbicularibus et plerumque cum cavitate parvo distali omnibus adscendentibus vel paucis divergentibus, stigmatibus 1–1.5 mm longis apicalibus ovalibus vel orbicularibus obscuris sulcatis obliquis centripetalibus, sinibus proximalibus profundis $\frac{1}{2}$ – $\frac{2}{3}$ ad fundam extentis, endocarpio supramedioli 2–2.2 cm longo osseoso obscure brunneo lateribus lateralibus 3–4 mm crassis, seminibus 12–15 mm longis ellipsoideis vel obliquiter ellipsoideis, mesocarpio in apice quaeque carpellae cavernam cum fibris fortibus longitudinalibus paucis et membranis medullosis formanti, mesocarpio basali fibroso et carnoso.

DESCRIPTION OF ALL SPECIMENS EXAMINED:

Tree 7 m tall, 18 cm in diameter; bark with prominent tubercles or warts; prop roots 1–1.5 m long, 4 cm in diameter, warty; leaves 1.3–1.6 m long, 5–7 cm wide near the base, 3.6–5.5 cm wide at the middle, coriaceous, in section depressed sinuous M-shaped, sword-shaped, tapering from the base to the subulate apex, but the actual tip not preserved, the very base amplexicaul and unarmed, but at 6–9 cm the margins with prickles 1.8–3 mm long, 3–11 mm apart, heavy subulate, ascending, brown or brown-tipped; the midrib below beginning at 15–20 cm up with prickles 1.6–2.2 mm long, 13–45 mm apart, slender subulate, ascending; at the midsection the margin with subulate-serrae 1–2 mm long, 4–10 mm apart; those of the midrib below similar but 10–32 mm apart; near the apex the margins and midrib below with subulate-serrulations 0.2–0.7 mm long, 2–7 mm apart; peduncle 13 cm long, bracted; syncarp solitary, the core 13 cm long, 4.5 cm in diameter, cylindrical-ellipsoid, obtusely deltoid; phalanges 4.8–5.6 cm long, 2.5–4.7 cm wide, 2.3–4.1 cm thick, orange-yellow, pyriform or cuneate-pyriform, the apex rounded (rarely flattish), upper $\frac{2}{5}$ free and in the free part the lateral sutures distinct from half to all its length, 4–7-angled, the sides smooth, shining, when dried light brown, gently curving or plane; apical central sinuses 3–6 mm deep, V-shaped;

carpels 6–13, the central apices somewhat the smaller, pyramidal or slightly oblate pyramidal to semiorbicular and most of them with a small distal concavity, the tips ascending or on a few slightly divergent; stigmas 1–2 mm long, apical, oval to orbicular, dark, creased, oblique, centripetal; proximal sinus deep, running $\frac{1}{2}$ – $\frac{2}{3}$ way to valley bottom; endocarp suprmedian, 2–2.2 cm long, bony, dark brown, the lateral walls 3–4 mm thick; seeds 12–15 mm long, ellipsoid or obliquely so; apical mesocarp in each carpel forming a cavern with a few strong longitudinal fibers and white medullary membranes; basal mesocarp fibrous and fleshy.

HOLOTYPE: Australia, Queensland, Green Island, off Cairns, beach forest with *Erythrina*, *Cordia subcordata*, *Morinda citrifolia*, Feb. 9, 1958, *H. St. John* 26,266 (BISH).



FIG. 243a. *Pandanus darwinensis* St. John, from holotype. Habit of mature trees.



FIG. 243b. *Pandanus darwinensis* St. John, from holotype. Young trees and a detached syncarp.

SPECIMENS EXAMINED: Australia, Queensland, Green Island, off Cairns, beach forest with *Erythrina*, *Cordia subcordata*, *Morinda citrifolia*, Feb. 9, 1958, H. St. John 26,269 (BISH); Percy I., Dec. 1870, McGeorge (MEL); South Brooke I., G. Tandy (A); cult., Botanic Garden (Brisbane), C. T. White 3,332 (A).

DISCUSSION: *P. adscendens* is a member of the section *Pandanus*, as is its closest relative *P. Blakei* St. John, also of Green I., a species with the phalanges with the central apical sinuses 1.5–3 mm deep; carpels 9–12; prop roots sparingly muriculate; leaves 8–8.5 cm wide, and the midrib below unarmed to beyond the middle. *P. adscendens* has the phalanges with the central apical sinuses 3–6 mm deep; carpels 6–13; prop roots warty; leaves 5–7 cm wide, and the midrib below beginning at 15–20 cm up with ascending slender subulate prickles 1.6–2.2 mm long, and 13–45 mm apart.

The new epithet is the Latin participle *adscendens*, ascending, and is given with reference to the direction of the lower spines of the leaves.

Pandanus darwinensis St. John (sect. *Pandanus*)

Fig. 243 a, b

An isotype of this species is found in the collections of Martelli in Firenze. With it is a letter from the collector, C. E. F. Allen, Superintendent of Agriculture, Darwin, Northern Territory, Australia, and two excellent photographs. These are reproduced here by permission of the Istituto Botanico, Firenze. From them the following additional details of description can be derived.

EXPANDED DIAGNOSIS: Trees up to 6 m in height; trunk erect, simple, at length forking into erect branches; prop roots, if any, short; bark rather smooth; leaves ascending, then spreading, not becoming bent; infructescence with a single syncarp; peduncle about 63 cm long, recurving; syncarp 28 cm long, 21 cm in diameter, wide ellipsoid, bearing about 26 phalanges.

The type locality is near Darwin, Northern Territory, and the photographs reveal that the species is littoral on marine shores.